

Surveys of Emerald Starling *Lamprotornis iris* in Sierra Leone

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Inventaires du Choucador iris *Lamprotornis iris* en Sierra Leone. En février–mars 2012, des inventaires du Choucador iris *Lamprotornis iris*, espèce « Insuffisamment connue », ont été réalisés sur trois zones au nord de la Sierra Leone : Bumbuna, le Lac Sonfon / Kabala, et la section Outamba du Parc National d'Outamba-Kilimi. L'espèce a été observée en nombre variable dans les trois zones (des comportements territoriaux ont été notés sur deux de celles-ci), suggérant que le Choucador iris est toujours assez bien répandu dans l'habitat approprié au sein de son aire de répartition dans le pays. Des recommandations sont données pour continuer les recherches sur l'espèce en Sierra Leone.

Summary. Surveys of the Data Deficient Emerald Starling *Lamprotornis iris* were conducted in three areas of northern Sierra Leone in February–March 2012. The species was observed in variable numbers in all three areas (with apparent territorial behaviour witnessed in two of them), suggesting that it remains reasonably widespread in suitable habitat within its known range in the country. Recommendations are given for follow-up work on the species in Sierra Leone.

The Emerald Starling *Lamprotornis iris*, sometimes placed in the monotypic genus *Coccycolius*, remains a poorly known West African endemic and is classified as Data Deficient by BirdLife International (2011a), because a lack of knowledge of its ecology, movements and population size currently hampers an accurate assessment of its conservation status. Recent records are confined to western and south-eastern Guinea, northern Sierra Leone and eastern Côte d'Ivoire (Borrow & Demey 2004), countries which are not always easily accessible, whilst the lightly timbered habitats it prefers lie apart from the remaining blocks of Upper Guinea rainforest where most recent birding effort and conservation work has been focused. The starling occurs in wooded and open savannas, and orchard bush, where it keeps to the tops of tall trees. It shuns closed forest but is occasionally found at the edge of gallery forest (Butchart 2007). Emerald Starling is a very attractive species with predominantly brilliant green plumage and purple patches around the eye and on the belly; it is unsurprising, therefore, that the bird trade may represent a threat to this species in some parts of its range (e.g. large numbers, thought to have originated from Guinea, were kept by bird traders in Monrovia, Liberia, in 1981–84; Craig & Feare 2009). In Sierra Leone, where travel has been easier in the last decade, the species has been recorded at several locations in the north of the country, with most recent observations by visiting foreign birders coming from track-edge habitats in

the Bumbuna area (e.g. Ryan 2006, Hornbuckle 2007; Birdquest tour reports 2008 and 2010, Rockjumper tour reports 2007, 2008 and 2009).

Very little is known about the ecology of the Emerald Starling. Nesting has not been described in the wild, although captive birds nest in tree holes (Feare & Craig 1998). A male collected with enlarged testes in February (Feare & Craig 1998) and a bird coming into breeding condition in Sierra Leone in March (Fry *et al.* 2000) are the only indications of the timing of breeding. These records suggest that nesting occurs towards the end of the dry season (November–April) but prior to the rainy season (May–October). The species is not always present at given locations, indicating at least local movements (Feare & Craig 1998). Emerald Starlings are generally encountered in groups of 4–10 birds but also in larger flocks of up to 20–50, whilst observations of captive birds suggest that pairs are territorial during nesting and the presence of helpers may indicate co-operative breeding (Feare & Craig 1998, Craig & Feare 2009). The species appears to have a rather catholic diet, feeding on the pulp and seeds of small fruit, including *Ficus* and *Harungana madagascariensis*, as well as on insects, including ants, which it takes from the ground (Feare & Craig 1998, Craig & Feare 2009).

The survey work reported here aimed to gather more data on the species. The team was invited by Dr Sama Monde, Executive Director of the Conservation Society of Sierra Leone (CSSL), in collaboration with the Royal Society



Figure 1. Location of the three study areas in northern Sierra Leone and the estimated range of Emerald Starling *Lamprolornis iris*.

Localisation des trois zones d'étude au nord de la Sierra Leone et répartition estimée du Choucador iris *Lamprolornis iris*.

for the Protection of Birds (RSPB) International, to conduct systematic surveys of Emerald Starlings in areas of the country where it had been previously recorded. Over the period 26 February–10 March 2012 we surveyed three areas of northern Sierra Leone to obtain baseline data on the species' distribution, density and habitat use, as well as to train relevant personnel in bird-monitoring techniques. The three areas chosen were: 1) Bumbuna, including the roads to Makeni, Magburaka, Bendugu and Bassaia, 2) Lake Sonfon and environs Important Bird Area (IBA; see BirdLife 2011b) / Kabala, including the roads to Koinadugu and Falaba, and 3) the Outamba section of Outamba-Kilimi National Park (OKNP; see BirdLife 2011b), including the road to Kamakwie (see Fig. 1).

Methods

The latter part of the dry season was chosen for survey work because many tracks are impassable during the wet season, whilst February–March is also believed to mark the start of the species' breeding season. Simple, repeatable distance sampling was conducted (Buckland *et al.* 1993), so that direct comparison of starling encounter rates could be made with future survey data. Survey points were selected using standardised random sampling by stopping every 1 km when driving along tracks / roads, or 1 km apart along footpaths where no driveable tracks were available (OKNP). Although habitats closer to tracks may be more degraded and disturbed than those further away, these were sampled as their ease of access permitted more points to be surveyed



Figure 2. Emerald Starling *Lamprotornis iris* habitat near Bumbuna, Sierra Leone, February 2012 (John Bowler)

Habitat du Choucador iris *Lamprotornis iris* près de Bumbuna, Sierra Leone, février 2012 (John Bowler)



Figure 3. Emerald Starling *Lamprotornis iris* habitat near Lake Sonfon, Sierra Leone, March 2012 (John Bowler)

Habitat du Choucador iris *Lamprotornis iris* près du Lac Sonfon, Sierra Leone, mars 2012 (John Bowler)



Figure 4. Emerald Starling *Lamprotornis iris* habitat along the Outamba entrance track, Sierra Leone, March 2012 (John Bowler)

Habitat du Choucador iris *Lamprotornis iris* le long de la piste d'entrée d'Outamba, Sierra Leone, mars 2012 (John Bowler)

in the limited time available, whilst visibility over the rather open habitats was generally very good. Where villages were encountered at survey points, we continued along the road / track until beyond the village edge. Numbers of all bird species present within a radius of 400 m calculated by eye of each survey point (an area of 0.5 km²) were recorded, in order to calculate comparable encounter rates, along with details of habitats present. Each point-count was 15 minutes long and was conducted between 07.00 and 11.30 hrs when birds were most active. The clock was stopped whenever Emerald Starlings

were located in order to permit more detailed observations on the birds and restarted again to complete a comparable 15-minute sample each time. Whenever Emerald Starlings were sighted, flock size, behaviour, food items and perch-choice were recorded. An attempt was made to cover all main habitat types at each sampling point for comparable bird count data, although Emerald Starlings were generally easily located by their distinctive calls. Counting was stopped after 15 minutes and the team moved to the next survey point. Up to nine survey points were covered per day. Attempts were made to trial survey work in the late afternoon, but bird activity was low at this time. Starling encounter rates in the afternoon would not, therefore, be directly comparable to those from the morning. Instead, more general monitoring was undertaken in the afternoon. During the survey, all observations were made using 8–10× binoculars and occasionally a 20–60× telescope. A GPS (Garmin Etrex) was trialled to obtain co-ordinates for each survey point but locating sufficient satellites to obtain an accurate fix was found to be very time-consuming. Maps and odometer readings were used to record locations of survey points.

Results

Bumbuna

A total of 42 survey points was completed over five days in the Bumbuna area (Table 1), all at 100–300 m a.s.l. Sixty-one Emerald Starlings were

Table 1. Numbers of Emerald Starlings *Lamprolornis iris* recorded during 15-minute point counts in northern Sierra Leone, 2012.

Tableau 1. Nombre de Choucadors iris *Lamprolornis iris* recensés pendant des comptages par point de 15 minutes au nord de la Sierra Leone, 2012.

Site	Date	Sub-site	Survey point								
			1	2	3	4	5	6	7	8	9
Bumbuna 11°45'W 08°55'N	26 Feb	Magburaka road	0	12	0	0	0	0	0	0	–
	27 Feb	Bendugu road	0	0	0	0	0	0	0	0	–
	28 Feb	Makeni road	32	0	0	11	0	0	0	0	0
	29 Feb	Bassaia road	0	0	0	0	0	0	0	0	–
	1 Mar	Magburaka road south	0	0	6	0	0	0	0	0	0
Lake Sonfon / Kabala 11°30'W 09°30'N	2 Mar	Makakura to Kondembaia	0	0	0	58	0	20	4	18	3
	3 Mar	Kondembaia to Yara	15	14	4	0	10	3	2	2	0
	4 Mar	Kabala to Koinadugu	2	6	3	2	2	1	0	2	–
	5 Mar	Falaba road	0	0	0	0	0	1	3	3	–
Outamba 12°10'W 09°40'N	7 Mar	Kamakwie–Outamba	0	0	0	0	0	0	0	0	–
	8 Mar	Outamba entrance track	0	3	2	0	2	0	1	–	–
	9 Mar	Outamba track east	0	0	0	0	0	0	0	0	–
	10 Mar	Outamba track north-east	0	0	0	0	0	0	–	–	–

recorded at four (9.5%) of the survey points. All were observed in flocks of 6–32 birds; there were no obvious territorial pairs. Habitats included wooded savannah, taller more intact forest that was restricted to hillsides and gallery forest along rivers, interwoven with a patchwork of farmbrush and cultivation including small rice fields along streams and scattered patches of oil-palms, plus more open grassy savannahs often with tall palms. Many areas of wooded savannah showed recent evidence of burning and selective felling of trees for timber, along with more extensive removal of smaller trees for poles and firewood. In addition, large areas of wooded habitat have been lost in recent years to open-cast iron-ore mines and their associated tailings, roads, railways and mining camps, whilst dust put up by heavy lorries from the mines coats all vegetation within 20 m of the roads. We recorded 151 bird species in this region, including the Near Threatened Yellow-casqued Hornbill *Ceratogymna elata*, as well as many Palearctic migrants that are currently undergoing population declines such as Tree Pipit *Anthus trivialis*, Whinchat *Saxicola rubetra* and Pied Flycatcher *Ficedula hypoleuca*.

Lake Sonfon / Kabala

Thirty-four survey points were completed over four days in the Lake Sonfon / Kabala area at 200–500 m. A total of 178 Emerald Starlings was recorded at 22 (64.7%) of the survey points

(Table 1). Emerald Starlings were observed both in flocks (numbering up to 58 individuals) and as territorial pairs (at least seven noted). Habitats in the area included extensive areas of wooded savannah encompassing large patches of taller more intact forest, a patchwork of farmbrush and cultivation including small rice fields along streams and scattered patches of oil-palms. Many areas of wooded savannah showed recent evidence of burning, although this was mostly at herb-layer level to stimulate growth of fresh grass for cattle grazing. There was also evidence of localised selective felling of timber trees and removal of smaller trees for poles and firewood. Density of villages was higher along the Falaba road, particularly south of Dogoloya, and habitats were generally less intact here than towards Lake Sonfon. We recorded 159 species, including several not recorded at Bumbuna, such as Red-thighed Sparrowhawk *Accipiter erythropus*, Black Bee-eater *Merops gularis*, Black Wood-hoopoe *Rhinopomastus aterrimus*, Yellow-bellied Hyliota *Hyliota flavigaster* and Blackcap Babbler *Turdoides reinwardtii*, as well as a lone singing Near Threatened Black-headed Rufous Warbler *Bathmocercus cerviniventris*.

Outamba

Twenty-nine survey points were completed over four days in the Outamba area at 100–200 m. A total of eight Emerald Starlings was recorded



Figure 5. Emerald Starling / Choucador iris *Lamprolaima iris*, Bumbuna, Sierra Leone, February 2010 (Nik Borrow)

at four (13.8%) of the survey points (Table 1). Emerald Starlings were only observed in territorial pairs during the timed survey work, although larger groups of up to 20 were seen outside this period. Habitats in the area were rather varied. Outside the national park there were extensive areas of wooded savannah, occasional patches of disturbed gallery forest, a patchwork of farm bush and cultivation including small rice fields along streams, plus larger areas of more open grassy savannah closer to Kamakwie. Almost all of the wooded savannah showed recent signs of burning with many dead and dying trees. There was also much evidence of selective felling of timber trees and removal of smaller trees for poles and firewood. Within the park, habitats were much more intact, although there was still evidence of recent extensive burning. The wooded savannahs were generally denser with a more intact canopy, whilst the tall gallery forest along the Little Scarcies River appeared to be relatively intact. The extensive wooded savannahs and gallery forest at Outamba produced a total of 152 bird species, including White-crested Tiger Heron *Tigriornis leucolopha*, African

Finfoot *Podica senegalensis*, Standard-winged Nightjar *Macrodipteryx longipennis*, Yellow-casqued Hornbill and Spotted Creeper *Salpornis spilonotus*, as well as large numbers of Turati's Boubous *Laniarius turatii*, which were much easier to observe here than at Bumbuna.

All sites

The overall encounter rate at all three sites was 9.4 Emerald Starlings per hour of survey effort ($n = 26.25$ hours) with encounter rates of 5.8 at Bumbuna ($n = 10.5$ hrs), 20.92 at Lake Sonfon/Kabala ($n = 8.5$ hours) and 1.08 at Outamba ($n = 7.25$ hours). Mean flock size was lower at Outamba (2.0) than at both Bumbuna (15.3) and Lake Sonfon / Kabala (4.8), since all birds encountered at Outamba appeared to be paired, although larger groups were also noted at this site but not during surveys. Flock size was highest at Bumbuna, where starlings were seen only in groups of six or more, and intermediate at Lake Sonfon, where they were seen in both territorial pairs and in larger groups. The presence of territorial pairs at Lake Sonfon and Outamba is suggestive of breeding activity at what is believed to be the start of the nesting season. All 30 survey points where Emerald Starlings were observed included areas of tall (10–25 m) savannah trees and 17 (57%) of these sites involved areas of grassy understory that had recently been burnt.

Emerald Starlings were mostly encountered in monospecific groups, but Violet-backed Starlings *Cinnyricinclus leucogaster* were recorded commonly at all three study sites and were sometimes seen in the company of Emerald Starlings. At Bumbuna, 60 Violet-backed Starlings were recorded at ten survey points including groups of six and ten birds that associated with two of the four Emerald Starling flocks. At Lake Sonfon / Kabala, 61 Violet-backed Starlings were recorded at 14 survey points, including 11 where Emerald Starlings were also present, but the only observed interactions between the two species were of five Violet-backed Starlings among a flock of 58 Emerald Starlings on 2 March and three more in a flock of ten Emerald Starlings on 3 March. At Outamba, 43 Violet-backed Starlings were recorded at 11 survey points and Emerald Starlings were observed to actively chase Violet-backed Starlings at two survey points on 8 March. The association between the two species took the form of mixed flocking at

Bumbuna and Lake Sonfon / Kabala, whereas at Outamba, some of the interactions appeared to be more territorial in nature (see below).

The only other starling species recorded during the survey included two Lesser Blue-eared Starlings *Lamprotornis chloropterus* at one survey point along the Koinadugu road east of Kabala on 4 March, plus a single and a pair of this species in the Outamba section of OKNP on 10 March, none of which interacted with Emerald Starlings. A pair of Chestnut-bellied Starlings *L. pulcher* was observed along the entrance track to Outamba on 8 March but these did not interact with a pair of Emerald Starlings perched nearby. A group of five Bronze-tailed Glossy Starlings *L. chalcurus* was observed further west along the Outamba entrance track on 8 March and although these did not interact with Emerald Starlings during the survey work, the same group was subsequently observed in a mixed starling flock that included at least six Emerald Starlings and four Violet-backed Starlings.

Emerald Starling activity

The majority of Emerald Starlings (60%) were encountered either perched high in mostly open trees of 10–25 m height or flying between perch sites, often calling as they did so. Although 21% of birds encountered were feeding on the ground, it is probable that the true proportion may have been higher, since birds on the ground rarely called and could have been overlooked. Birds were observed feeding on insects on recently burnt ground or, more rarely, on cultivated ground, and in trees on various berries and fruits including figs, although the latter was only observed directly in the Lake Sonfon area. Three birds were observed carrying large insects, one of which was eaten by the bird carrying it after perching on a high branch, indicating that food-carrying may not necessarily relate to pair-bonding or nesting. Aggressive behaviour was noted at Bumbuna where two Emerald Starlings were observed fighting within a flock and at Outamba where one bird was seen to repeatedly chase a pair of Violet-backed Starlings that appeared to be nesting in a tree hole, while another pair appeared to chase a pair of Violet-backed Starlings from a dead tree. Birds were only recorded singing in the Lake Sonfon area, including one bird that was perched high in a tree apparently guarding another bird

that was quietly feeding on figs below it. None of the Emerald Starlings observed in the field showed any obvious signs of juvenile plumage, presumably either because juveniles raised during the 2011 wet season (April–June) had already moulted into adult-type plumage by late February 2012, or because no juveniles were present in the areas visited.

Discussion

From the survey results it would appear that Emerald Starling is still reasonably widespread in suitable habitat in northern Sierra Leone, although occurring in widely different densities according to location. The species appeared to be very localised in the Bumbuna area, with all but six being observed feeding, often with Violet-backed Starlings, in more open areas of wooded savannah with burnt ground and scattered tall trees within 5 km of Bumbuna town itself, which accords with other recent records of the species in the area (e.g. Hornbuckle 2007, Rockjumper tour reports 2007–09). Birds were absent from denser hill and gallery forest and the more open savannahs east along the Bendugu road, as well as from more disturbed wooded habitats south-east along the Bassaia road and in areas with denser oil-palm plantations south along the Makeni road. Clearly, Bumbuna remains a stronghold for the species. However, habitats in the surrounding area are fast being modified as a result of ongoing open-cast mining, and the species' future here must be considered uncertain. The Bumbuna to Makeni road, described as 'slow' as recently as 2006 (Hornbuckle 2007), is now a resurfaced dusty highway busy with lorries. A flock of c.100 Emerald Starlings was recorded in the Ferengbaia Hills south-east of Bumbuna within the last five years, in an area ear-marked for the tailings of adjacent open-cast mines (A. Okoni-Williams *in litt.* 2012). Other reports from the area include several large flocks along the Makeni–Magburaka road in early February 2012 (CSSL pers. comm.) although we failed to locate any on 25 February and 1 March 2012.

Emerald Starlings were both most numerous and most widespread in the Lake Sonfon / Kabala area, with the largest numbers along the Makakura–Yara road within the Lake Sonfon and environs IBA. This area of rolling hills appeared to have the best mix of habitats for

the species, comprising large areas of relatively intact wooded savannah currently untouched by large-scale mining activity, with scattered village clearings and cultivated patches with frequent tall trees. Flocks of Emerald Starlings, occasionally mixed with Violet-backed Starlings, were recorded in wooded savannah on the edge of small-scale cultivation, feeding on figs and other fruits, as well as insects, in areas where the grass understorey had been recently burnt by Fula cattle herders to encourage new growth. Pairs were also observed behaving in a territorial manner, including males in sub-song and mate guarding, which was suggestive of potential breeding at the start of the presumed nesting season. Wilkinson (2000) states that Emerald Starlings are loosely colonial breeders, so it may be that they also flock during the nesting season. Starlings were also widespread east of Kabala along the Koinadugu road and have recently been observed at Sinikoro, a further 30 km south-east of Koinadugu in the foothills of the Loma Mountains (R. Demey *in litt.* 2012). The species was found at lower density in more disturbed wooded savannah north of Kabala along the Falaba road, whilst at least three individuals were observed at the edge of cultivation along the Kabala–Makeni road, in the wooded hills south-west of Fadugu on 1 and 6 March 2012.

Emerald Starlings were very local in the Outamba area. Small numbers were restricted to open wooded savannah with recently burnt grassy understorey along the park's entrance track. These birds appeared to be engaged in territorial activity and spent much time chasing apparently nesting pairs of Violet-backed Starlings. We failed to locate Emerald Starlings at any of the 14 survey points within the more intact habitats in the main section of the park, where the species was apparently replaced by Lesser Blue-eared Starling. Another suitable patch of habitat holding Emerald Starlings apparently exists much further east into the park (Outamba forest guards pers. comm.). The separate Kilimi section of OKNP lies 30 km west of Outamba and apparently supports the extensive open wooded savannah habitat preferred by Emerald Starlings, but was unreachable due to a shortage of petrol north of Makeni. Recent reports of Emerald Starlings in significant numbers in OKNP (e.g. Forget & Langhendries 2010) may reflect their apparent abundance along the Outamba entrance track or may refer instead

to the Kilimi section of the park. Unfortunately, the Outamba section of OKNP has recently been invaded by hundreds of illegal gold miners, who have set fire to some areas and forced some of the park's big game to move into adjacent agricultural areas, creating further problems for villagers and forest guards there.

Using these and previous observations, it is possible to estimate the current range of Emerald Starling in Sierra Leone (Fig. 1). The southernmost records are from just north of Magburaka and south-east of Makeni, whilst the north-westernmost records are from the Kilimi section of OKNP and the north-easternmost from the foothills of the Loma Mountains near Sinikoro, with Bumbuna, Kabala and the Lake Sonfon IBA lying within the core of this range. It seems probable that the species is patchily present, at least seasonally, in suitable habitat throughout this area north to Falaba and its range is potentially contiguous with populations in similar habitats north of the border in Guinea, where Emerald Starling is known from Balandougou IBA at 12°35'W 10°27'N (BirdLife International 2011b). The species faces threats from anthropomorphic habitat change throughout this area, particularly large-scale clearance of wooded savannah for open-cast mining and agriculture, but its ability to survive and even thrive in patchy wooded savannah interspersed with cultivation and farmbrush gives some hope for its long-term survival.

Recommendations

At the end of our survey we hosted a seminar on our findings through the STEWARD organisation in Freetown, attended by representatives from local NGOs, including CSSL, and the Forestry Division of the Ministry of Agriculture. Key recommendations are:

- Upgrade Lake Sonfon and environs IBA to National Park status to prevent the development of large-scale mining activity there.
- Remove illegal gold miners from the Outamba section of OKNP before they create more extensive damage, and conduct a survey of the Kilimi section for Emerald Starlings.
- Repeat surveys of the areas surveyed in February–March 2012 to investigate between-year and seasonal differences in Emerald Starling numbers.

- Conduct surveys of other areas of similar habitat to more completely determine Emerald Starling distribution.
- Use the results from this and follow-up surveys to produce an estimate of the Emerald Starling population in Sierra Leone by 2015.
- Monitor bird markets in Freetown and elsewhere in Sierra Leone to check if the species is being caught for the bird trade.

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